

Chapter 8. State Indicators

8-46 Academic Science and Engineering Article Output per 1,000 Science, Engineering, and Health Doctorate Holders in Academia

Description

The volume of peer-reviewed articles published per 1,000 academic SEH doctorate holders is an approximate measure of their contribution to scientific knowledge. Publications are only one measure of academic productivity, which includes personnel trained, patents, trademarks, copyrights, and other outputs. A high value on this indicator shows that the SEH faculties in a state's academic institutions are generating a high volume of publications relative to the number of science, engineering, and health doctorate holders employed at academic institutions in the state. Academic institutions include 2-year colleges, 4-year colleges and universities, medical schools, and university-affiliated research centers. Research is more central to the mission of some of these institutions than others.

Publication counts are based on the number of articles that appear in a set of journals tracked by Elsevier's Scopus database as of May 2015. The journal set consists of science and engineering publications (including publications on the natural sciences, the applied sciences, the medical sciences, and the social sciences but excluding the arts and humanities). Only documents published in refereed scientific journals were counted (mostly articles, reviews, and conference proceedings), as these documents were reviewed by peers prior to being accepted for publication. The peer-review process ensures that the research is of good quality and constitutes an original contribution to scientific knowledge. Fractional counting at the level of researchers is used to ensure that a single paper is not counted several times. For example, if two of three authors are in state A and the third author is in state B, then two-thirds of the publication are attributed to state A, and one-third is attributed to state B.

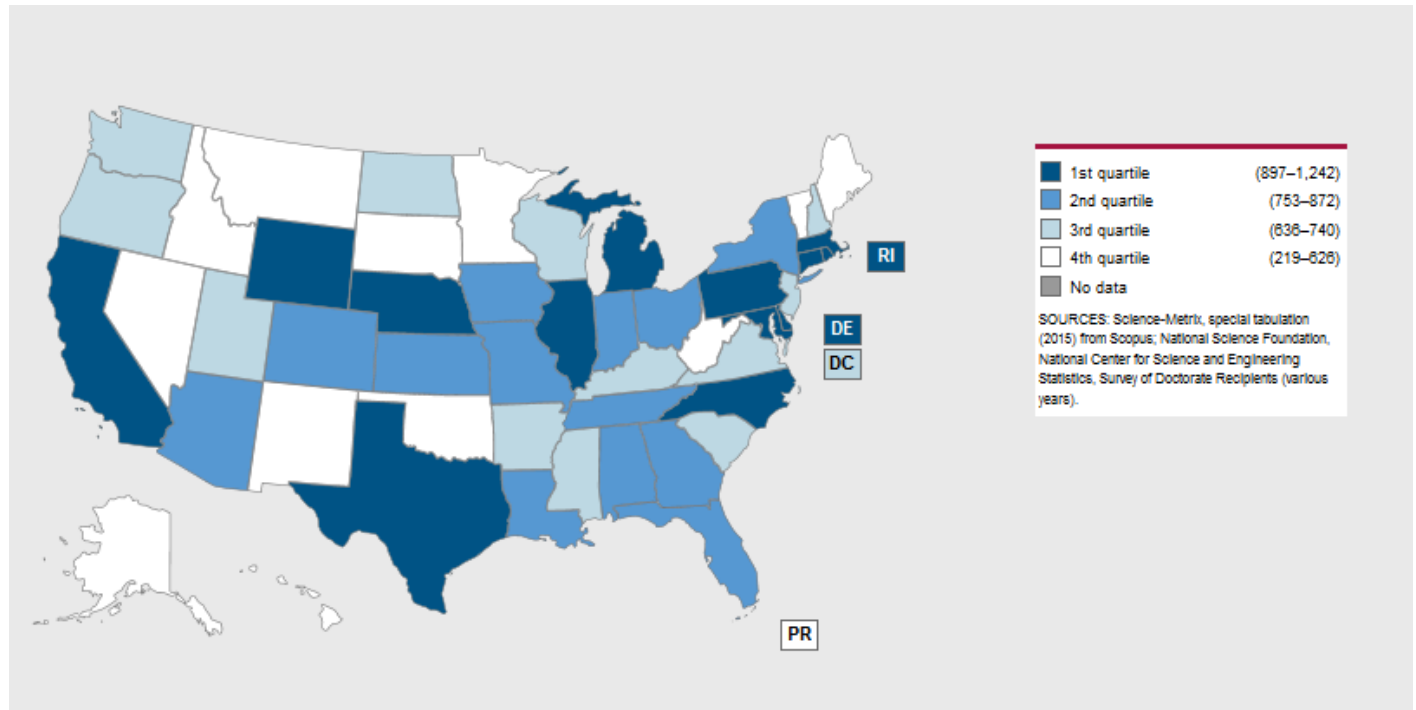
SEH doctorates include those in computer sciences; mathematics; the biological, agricultural, or environmental life sciences; physical sciences; social sciences; psychology; engineering; and health fields. SEH doctorate data are estimates and exclude those with doctorates from foreign institutions and those older than the age of 75. Data for SEH doctorate holders in academia are presented by employment location, regardless of residence. Estimates for states with smaller populations of SEH doctorate holders are generally less precise than estimates for states with larger populations.

Findings

- Between 2003 and 2013, the number of scientific and engineering articles published by academia increased from 213,224 to 308,255 (an increase of 45%) and the number of SEH doctorate holders in academia increased from 267,200 to 327,300 (an increase of 22%).
- Nationwide, researchers published an average of 942 articles per 1,000 SEH doctorate holders in academia in 2013 compared with 798 in 2003.
- In 2013, the values across the states ranged from 384 to 1,242 S&E articles per 1,000 SEH doctorate holders in academia.
- The publication rate for academic SEH doctorate holders in states in the top quartile was nearly twice as high as for states in the bottom quartile.

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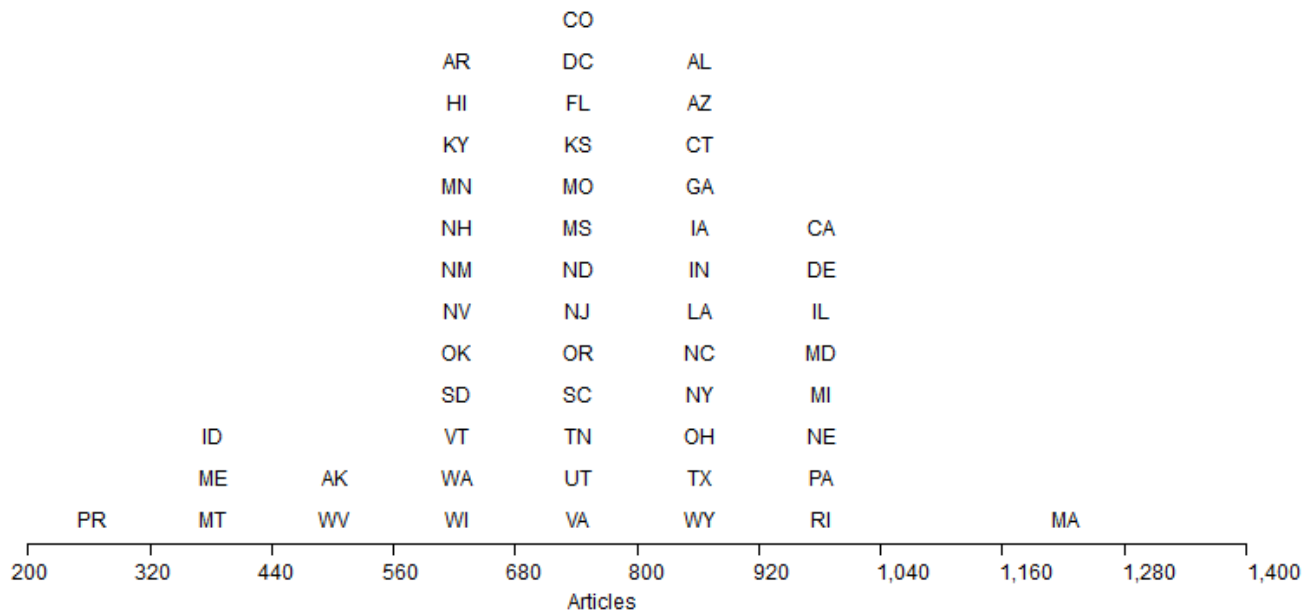
Year: 2013



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Distribution of states across indicator values



Histograms do not display states with extreme values. Please consult the data tables for exact indicator values for each state.

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Table 8-46 Academic Science and Engineering Article Output per 1,000 Science, Engineering, and Health Doctorate Holders in Academia

State	Academic S&E articles/1,000 SEH doctorate holders in academia (Articles)						
	1999	2001	2003	2006	2008	2010	2013
United States	748	764	798	942	992	964	942
Alabama	703	766	776	903	946	869	853
Alaska	370	454	422	495	546	536	498
Arizona	890	837	918	962	994	1,042	845
Arkansas	445	501	482	571	772	587	660
California	860	883	875	1,084	1,062	1,023	938
Colorado	625	657	625	752	821	753	757
Connecticut	710	731	818	905	857	858	904
Delaware	789	818	1,083	1,165	1,291	1,030	921
District of Columbia	604	604	677	764	895	838	717
Florida	688	687	764	929	946	865	775
Georgia	687	707	724	818	840	836	823
Hawaii	463	458	414	581	575	634	577
Idaho	385	420	383	401	434	465	425
Illinois	789	772	874	969	1,038	982	989
Indiana	675	638	711	849	951	881	872
Iowa	699	752	769	841	771	760	823
Kansas	737	648	683	657	664	802	780
Kentucky	537	510	563	606	696	671	673
Louisiana	694	617	690	753	872	963	850
Maine	261	312	329	387	379	459	384
Maryland	970	1,006	942	1,059	1,014	1,031	971
Massachusetts	940	989	965	1,178	1,353	1,309	1,242
Michigan	740	680	763	872	985	906	921
Minnesota	522	509	546	600	667	616	626

State	Academic S&E articles/1,000 SEH doctorate holders in academia (Articles)						
	1999	2001	2003	2006	2008	2010	2013
Mississippi	400	419	509	648	702	705	689
Missouri	661	676	702	821	881	800	757
Montana	335	499	405	488	457	431	428
Nebraska	629	648	694	887	884	773	927
Nevada	534	438	550	563	728	684	560
New Hampshire	590	583	678	843	635	643	636
New Jersey	713	668	733	804	818	774	701
New Mexico	410	347	384	650	626	595	580
New York	711	749	780	907	914	889	858
North Carolina	731	692	718	821	862	879	897
North Dakota	375	421	589	552	697	581	701
Ohio	626	660	678	830	903	876	871
Oklahoma	433	408	475	548	587	542	601
Oregon	611	607	585	740	817	741	714
Pennsylvania	774	796	771	880	993	960	955
Rhode Island	616	608	576	717	865	983	937
South Carolina	507	560	648	621	676	689	682
South Dakota	253	283	363	340	484	586	600
Tennessee	600	570	575	676	762	705	753
Texas	808	806	838	928	941	908	907
Utah	656	628	729	731	768	817	740
Vermont	411	456	461	593	648	664	623
Virginia	562	632	652	691	695	714	692
Washington	643	598	639	667	697	702	677
West Virginia	378	425	436	536	576	586	528
Wisconsin	673	686	779	795	802	705	674
Wyoming	380	337	520	648	718	746	912
Puerto Rico	260	240	262	358	368	350	219



Academic S&E articles/1,000 SEH doctorate holders in academia (Articles)

State	1999	2001	2003	2006	2008	2010	2013
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SEH = science, engineering, and health.

NOTES: The total for the United States includes publications for which the author location could not be determined.

Employed SEH doctorate holders are classified by employment location.

SOURCES: Science-Metrix, special tabulation (2015) from Scopus; National Science Foundation, National Center for Science and Engineering Statistics, Survey of Doctorate Recipients (various years).

Science and Engineering Indicators 2016

State	Academic S&E article output						
	1999	2001	2003	2006	2008	2010	2013
United States	182,313	191,427	213,224	262,781	276,711	289,687	308,255
Alabama	2,250	2,298	2,484	2,979	3,217	3,127	3,411
Alaska	185	227	253	297	382	375	398
Arizona	2,580	2,677	3,122	3,657	3,877	4,063	4,139
Arkansas	757	801	867	1,085	1,158	1,173	1,254
California	21,496	22,166	24,938	29,918	31,331	32,517	33,034
Colorado	2,873	3,154	3,190	3,985	4,106	4,217	4,923
Connecticut	3,197	3,072	3,437	4,074	4,198	4,464	4,880
Delaware	552	654	758	932	1,033	927	1,013
District of Columbia	1,449	1,509	1,625	1,757	1,789	1,927	2,078
Florida	5,090	5,360	6,263	8,361	8,801	9,259	9,843
Georgia	3,983	4,452	5,069	6,053	6,551	7,023	7,410
Hawaii	648	687	746	929	1,035	1,015	1,038
Idaho	308	378	421	561	564	558	638
Illinois	8,049	8,178	9,180	11,050	11,527	11,975	12,071
Indiana	3,442	3,573	4,053	5,180	5,518	5,904	6,103
Iowa	2,306	2,405	2,613	2,943	3,008	2,963	3,129
Kansas	1,400	1,426	1,571	1,708	1,794	2,006	2,106
Kentucky	1,664	1,633	1,858	2,180	2,366	2,349	2,490
Louisiana	2,220	2,036	2,345	2,560	2,528	2,889	2,721
Maine	339	343	395	464	455	505	499
Maryland	5,527	5,835	6,405	7,628	7,913	8,146	9,027
Massachusetts	12,313	12,756	13,707	16,845	17,723	18,462	20,116
Michigan	5,769	5,918	6,795	8,109	8,670	9,237	9,859
Minnesota	2,612	2,696	2,949	3,359	3,536	3,696	3,943
Mississippi	839	838	1,018	1,296	1,334	1,339	1,377
Missouri	3,568	3,788	3,931	4,599	5,022	5,043	5,149
Montana	369	399	445	586	548	560	557
Nebraska	1,133	1,231	1,250	1,597	1,592	1,624	1,762

State	Academic S&E article output						
	1999	2001	2003	2006	2008	2010	2013
Nevada	534	570	660	900	1,019	957	840
New Hampshire	590	699	813	1,012	953	1,028	1,081
New Jersey	3,353	3,608	4,177	4,823	4,906	4,878	5,114
New Mexico	1,066	972	1,074	1,364	1,378	1,368	1,392
New York	14,438	15,134	16,453	19,768	20,098	21,078	22,471
North Carolina	5,921	5,955	6,605	8,132	8,710	9,141	10,044
North Dakota	300	295	412	552	627	639	701
Ohio	6,327	6,472	6,980	8,388	8,758	8,852	9,672
Oklahoma	1,125	1,142	1,331	1,535	1,760	1,789	1,922
Oregon	1,832	1,883	2,105	2,589	2,695	2,595	2,854
Pennsylvania	10,068	10,581	11,795	13,906	14,596	15,367	16,136
Rhode Island	1,109	1,033	1,210	1,434	1,471	1,572	1,687
South Carolina	1,421	1,623	1,814	2,172	2,365	2,481	2,658
South Dakota	177	170	218	238	339	410	480
Tennessee	2,640	2,679	2,935	3,717	4,114	4,230	4,822
Texas	10,743	10,960	12,400	15,400	16,555	17,524	18,694
Utah	1,836	1,885	1,967	2,559	2,610	2,859	3,033
Vermont	411	456	461	593	583	598	623
Virginia	3,543	4,111	4,562	5,248	5,770	5,998	6,225
Washington	3,664	3,705	4,218	4,671	4,946	5,054	5,345
West Virginia	416	468	523	697	691	762	844
Wisconsin	3,502	3,428	3,897	4,530	4,731	4,725	4,986
Wyoming	228	202	260	324	359	373	456
Puerto Rico	234	240	341	466	479	525	394



Academic S&E article output							
State	1999	2001	2003	2006	2008	2010	2013
SEH = science, engineering, and health.				SOURCES: Science-Metrix, special tabulation (2015) from Scopus; National Science Foundation, National Center for Science and Engineering Statistics, Survey of Doctorate Recipients (various years).			
NOTES: The total for the United States includes publications for which the author location could not be determined. Employed SEH doctorate holders are classified by employment location.				<i>Science and Engineering Indicators 2016</i>			

State	SEH doctorate holders in academia						
	1999	2001	2003	2006	2008	2010	2013
United States	243,800	250,600	267,200	278,900	279,000	300,400	327,300
Alabama	3,200	3,000	3,200	3,300	3,400	3,600	4,000
Alaska	500	500	600	600	700	700	800
Arizona	2,900	3,200	3,400	3,800	3,900	3,900	4,900
Arkansas	1,700	1,600	1,800	1,900	1,500	2,000	1,900
California	25,000	25,100	28,500	27,600	29,500	31,800	35,200
Colorado	4,600	4,800	5,100	5,300	5,000	5,600	6,500
Connecticut	4,500	4,200	4,200	4,500	4,900	5,200	5,400
Delaware	700	800	700	800	800	900	1,100
District of Columbia	2,400	2,500	2,400	2,300	2,000	2,300	2,900
Florida	7,400	7,800	8,200	9,000	9,300	10,700	12,700
Georgia	5,800	6,300	7,000	7,400	7,800	8,400	9,000
Hawaii	1,400	1,500	1,800	1,600	1,800	1,600	1,800
Idaho	800	900	1,100	1,400	1,300	1,200	1,500
Illinois	10,200	10,600	10,500	11,400	11,100	12,200	12,200
Indiana	5,100	5,600	5,700	6,100	5,800	6,700	7,000
Iowa	3,300	3,200	3,400	3,500	3,900	3,900	3,800
Kansas	1,900	2,200	2,300	2,600	2,700	2,500	2,700
Kentucky	3,100	3,200	3,300	3,600	3,400	3,500	3,700
Louisiana	3,200	3,300	3,400	3,400	2,900	3,000	3,200
Maine	1,300	1,100	1,200	1,200	1,200	1,100	1,300
Maryland	5,700	5,800	6,800	7,200	7,800	7,900	9,300
Massachusetts	13,100	12,900	14,200	14,300	13,100	14,100	16,200
Michigan	7,800	8,700	8,900	9,300	8,800	10,200	10,700
Minnesota	5,000	5,300	5,400	5,600	5,300	6,000	6,300
Mississippi	2,100	2,000	2,000	2,000	1,900	1,900	2,000
Missouri	5,400	5,600	5,600	5,600	5,700	6,300	6,800
Montana	1,100	800	1,100	1,200	1,200	1,300	1,300
Nebraska	1,800	1,900	1,800	1,800	1,800	2,100	1,900

State	SEH doctorate holders in academia						
	1999	2001	2003	2006	2008	2010	2013
Nevada	1,000	1,300	1,200	1,600	1,400	1,400	1,500
New Hampshire	1,000	1,200	1,200	1,200	1,500	1,600	1,700
New Jersey	4,700	5,400	5,700	6,000	6,000	6,300	7,300
New Mexico	2,600	2,800	2,800	2,100	2,200	2,300	2,400
New York	20,300	20,200	21,100	21,800	22,000	23,700	26,200
North Carolina	8,100	8,600	9,200	9,900	10,100	10,400	11,200
North Dakota	800	700	700	1,000	900	1,100	1,000
Ohio	10,100	9,800	10,300	10,100	9,700	10,100	11,100
Oklahoma	2,600	2,800	2,800	2,800	3,000	3,300	3,200
Oregon	3,000	3,100	3,600	3,500	3,300	3,500	4,000
Pennsylvania	13,000	13,300	15,300	15,800	14,700	16,000	16,900
Rhode Island	1,800	1,700	2,100	2,000	1,700	1,600	1,800
South Carolina	2,800	2,900	2,800	3,500	3,500	3,600	3,900
South Dakota	700	600	600	700	700	700	800
Tennessee	4,400	4,700	5,100	5,500	5,400	6,000	6,400
Texas	13,300	13,600	14,800	16,600	17,600	19,300	20,600
Utah	2,800	3,000	2,700	3,500	3,400	3,500	4,100
Vermont	1,000	1,000	1,000	1,000	900	900	1,000
Virginia	6,300	6,500	7,000	7,600	8,300	8,400	9,000
Washington	5,700	6,200	6,600	7,000	7,100	7,200	7,900
West Virginia	1,100	1,100	1,200	1,300	1,200	1,300	1,600
Wisconsin	5,200	5,000	5,000	5,700	5,900	6,700	7,400
Wyoming	600	600	500	500	500	500	500
Puerto Rico	900	1,000	1,300	1,300	1,300	1,500	1,800

	SEH doctorate holders in academia						
State	1999	2001	2003	2006	2008	2010	2013
SEH = science, engineering, and health.	SOURCES: Science-Metrix, special tabulation (2015) from Scopus; National Science Foundation, National Center for Science and Engineering Statistics, Survey of Doctorate Recipients (various years).						
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